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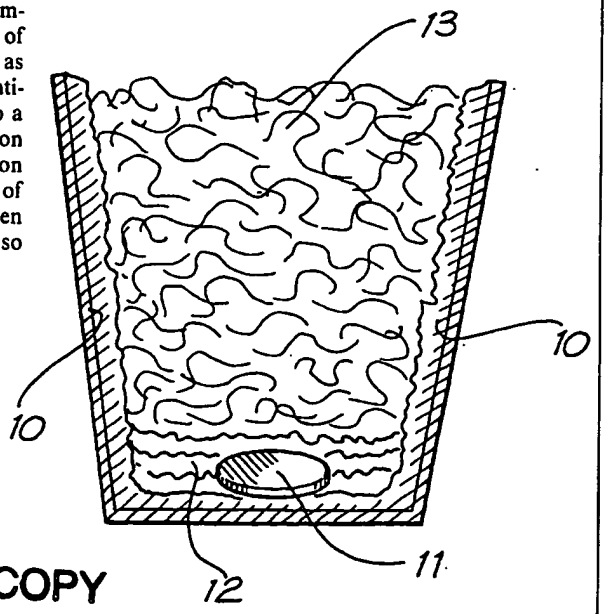
(54) Title: PLANT POTS

(57) Abstract

A plant pot comprising a hardened matrix of fibres (10) forming the wall and exterior surface of the pot and a low density matrix of similar fibres (13) within the pot. A method of forming a plant pot as described by preparing a slurry of fibres of a fibrous material compatible with plant growth, introducing a first portion of the slurry into a perforated mould while the mould is subject to a vacuum externally on all sides but not the top or bottom, allowing a film of fibres to form on the inside of all sides of the mould to constitute the external shell of the plant pot and introducing a further portion of the slurry and then additionally applying a vacuum from top and bottom of the mould so as to form a low density matrix within the plant pot.



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PLANT POTS

The present invention is concerned with plant pots and, more particularly, with moulded plant pots prepared from a slurry of a fibrous material.

A typical prior art system for moulding such articles is described in United States Patent No. 3,719,553 in which a water permeable mould is submerged in a slurry and the inside of the mould is placed under vacuum. This has the effect of drawing the slurry towards the mould, the water passing through the mould but the fibres collecting on the outside of the mould to form an article having the shape of the mould. The article is then subject to further shaping.

A similar system is described in United States Patent No 3,793,138 where a suction head is placed inside a mould and used to pull fibres onto the outside of the mould. The invention in that instance is characterised by moving the suction head within the mould so as to pull a suction on additional areas of the mould for different lengths of time to deposit different quantities of fibre thereby shaping the article.

Articles such as plant pots produced in this manner tend to have a hard, dry inner surface since it is this surface which is formed first and then remains under vacuum as more fibres are pulled from the suspension to thicken the wall of the article. This is disadvantageous where the moulded article is a plant pot or the like which is designed to be a temporary vehicle for aiding the growth of plants in the early stages since the roots of the plant must be eventually able to break through the pot as it breaks down. In addition, such pots must first be removed from the mould and then filled with a suitable medium for plant growth to be sustained.

It is an object of the present invention to provide moulded plant pots having advantageous characteristics.

The invention in one broad aspect of the invention consists in a process of moulding a plant pot comprising the steps of:-

(a) preparing a slurry of fibres of a fibrous material compatible with plant growth;

(b) introducing a first portion of the slurry into a perforated mould while the mould is subject to a vacuum externally on all sides but not the top or bottom;

(c) allowing a film to form on the inside of all sides of the mould, the film constituting the external shell of the plant pot;

(d) introducing a further portion of the slurry then additionally applying a vacuum from top and bottom of the mould so as to form a low density matrix of fibres within the plant pot; and

(e) removing the plant pot from the perforated mould.

Preferably, the fibrous slurry is introduced to the mould at a temperature of the order of 90$^{o}$C and the internal mould temperature is also maintained at about this temperature by the introduction of super heated steam. This ensures that when a vacuum is pulled moisture in the slurry will evaporate to effect vacuum drying of the article.

The density of the low density matrix of filling fibre is controlled mainly by the composition of the slurry. Preferably, a slurry comprising 1.25 to 0.9 kilograms of paper to 12 litres water is used to form a pot that is suitable for plants. The density of the filling fibre must be sufficiently low that it will not provide a barrier to the root system and restrict growth of the plant.

The preferred fibrous material is paper since it is readily available and otherwise creates disposal problems. Paper may be readily mixed with water by conventional methods and reduced to a slurry of individual

fibres. Newspaper is particularly suitable for the process since it slurries well and there is no waste. Additionally, it contains trace elements such as zinc, iron, phosphorous, sulphur and organic carbon which as act as plant growth enhancers as well as providing a suitable matrix for fertilizers.

Where the fibrous material is obtained from newsprint it is desirable that is shall be treated with a chlorine scavenger e.g. sodium thiosulphate, a quantity of one gram of chlorine scavenger being added to each 500gms of newsprint. This is to prevent the relatively large quantities chlorine and sodium in the newsprint from adversely affecting a plant in a pot according to the invention or the surrounding soil. A wetting agent such as BS1000 in the proportion of 1ml to 2 litres of water can advantageously be mixed with a slurry. It is to be observed that the ink of the newsprint contains a variety of trace elements that can be beneficial to the growth of a plant.

It can be advantageous to add a micro activator such as molasses or some other sugary compound to a aid the breakdown of the pot. Where molasses is added it is on the basis of a litre to 2000 litres of slurry.

In a further broad aspect the invention consists in a moulded plant pot comprising a hardened matrix of fibres compatible with plant growth forming the wall and exterior surface of the pot and a low density matrix of similar fibres within the pot.

Advantageously, the plant pot, is formed with tapered sides since tapered sides allows the pot to be wedged firmly into the ground which enhances root growth. Tapered sides also help prevent root binding which is caused by roots deflecting off the base of solid based pots, e.g. plastic pots. In addition, a pot with tapered sides is well adapted for matching planting.

The pot may have a seed hole formed in the top of the pot. This ensures the correct positioning of seeds and depth of the plant, the required depth normally being of the order of 5 to 15mm, preferably 6 to 7mm. This also prevents the destruction of the seed if it is planted by pressing it into the soil with substantial force. The pot may contain additives such as fungicides, if necessary and may undergo other treatments as required.

It is a further advantage of pots in accordance with the present invention that the fibres break down over time to increase the amount of organic matter in the soil. This reduces the amount of fertiliser required and has the additional benefit that any added fertiliser is locked in the pot and so does not leach into the water table. Once the pot breaks down and any remaining fertiliser is released, the roots of the plant are sufficiently well developed that the nutrients are absorbed. In addition, the fibrous material draws moisture from the surrounding ground into the root which ensures the availability of moisture for the plant. In this respect its behavior is similar to natural materials such as peat moss.

Optionally, the pot can contain a fertilised capsule in the base of the pot which is protected against penetration by the root system by a densely formed mesh of fibres. The fibres only allowing leaching of the nutrients to the root system outside the pot once the plant has reached an advanced state of growth. Thus, the pot would also sustain later growth and would constitute a fully self-contained growth system.

In order to form a pot containing a fertiliser capsule protected by a mesh of fibres the process described above is varied by dropping the capsule into the pot after step (c) and before step (d) and thereafter adding a portion of the slurry and applying vacuum only at the bottom of the mould. A suitable fertiliser capsule

would comprise fertiliser encapsulated in gelatin but any type of capsule may be used.

In order that the invention may be made readily understood reference will now be made to the accompanying drawings, in which:-

Fig. 1 is a sectional view of a pot in accordance with the present invention.

From the drawing it will be seen that the pot which is tapered and open at the top has tapered sides 10 which are of relatively high density to give strength and substance to the pot. It is to be noted that while the outside of the pot is relatively smooth, the fibres having been pressed against the mould, the inside surface is relatively rough to allow penetration by roots of a plant. The particular form of the invention illustrated includes a fertiliser capsule 11 supported on the bottom 12 which is formed by the additional step between steps (c) and (d). The interior of the pot is filled with a low density matrix of fibres 13.

A seed may be placed in a suitable hole in the top of the low density matrix 13. When the seed germinates and the plant grows its roots spread down through the matrix 13 and eventually out of the bottom of the pot. By then the pot will have been placed in soil and the roots will continue to progress into the soil and the plant grow in the normal way. As explained above, the pot will eventually break down.

A pot according to the invention may be formed in any suitable apparatus. For small quantity production a perforated stainless steel mould is used, the mould being placed in suitable apparatus to be enable a vacuum to be applied to its various parts as described above. In this connection, the word "vacuum" is to be taken to mean under sub-atmospheric pressure and not a complete absence of air.

Where pots are to be manufactured on a large scale

suitable machinery would be used whereby the various steps are carried out sequentially and automatically. Such machinery, however, does not form a part of the present invention.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

CLAIMS

1. A moulded plant pot comprising a hardened matrix of fibres compatible with plant growth forming the wall and exterior surface of the pot and a low density matrix of similar fibres within the pot.

2. A moulded plant pot as claimed in claim 1, wherein the fibres are fibres of newsprint derived from a slurry to which a chlorine scavenger has been added.

3. A moulded plant pot as claimed in claims 1 or 2, wherein molasses or other sugary compound has been added to a slurry from which the fibres are derived.

4. A moulded plant pot as claimed in any one of the preceding claims wherein there is below the low density matrix of fibres towards the bottom of the pot a fertiliser capsule covered by a densely formed mesh of fibres.

5. A process of moulding a plant pot comprising the steps of:-

(a) preparing a slurry of fibres of a fibrous material compatible with plant growth;

(b) introducing a first portion of the slurry into a perforated mould while the mould is subject to a vacuum externally on all sides but not the top or bottom;

(c) allowing a film to form on the inside of all sides of the mould, the film constituting the external shell of the plant pot;

(d) introducing a further portion of the slurry then additionally applying a vacuum from top and bottom of the mould so as to form a low density matrix within the plant pot; and

(e) removing the plant pot from the perforated mould.

6. A process of moulding a plant pot as claimed in claim 5 wherein an additional step is included between steps (c) and (d) which comprises the introduction of a fertiliser capsule into the pot and thereafter adding a portion of a slurry and applying vacuum only at the bottom of the mould to produce a

densely formed mesh of fibres above the capsule.

7. A process of moulding a plant pot as claimed in any one of the preceding claims wherein the slurry of fibres is introduced into the mould at a temperature of the order of 90°C and maintained at about this temperature.

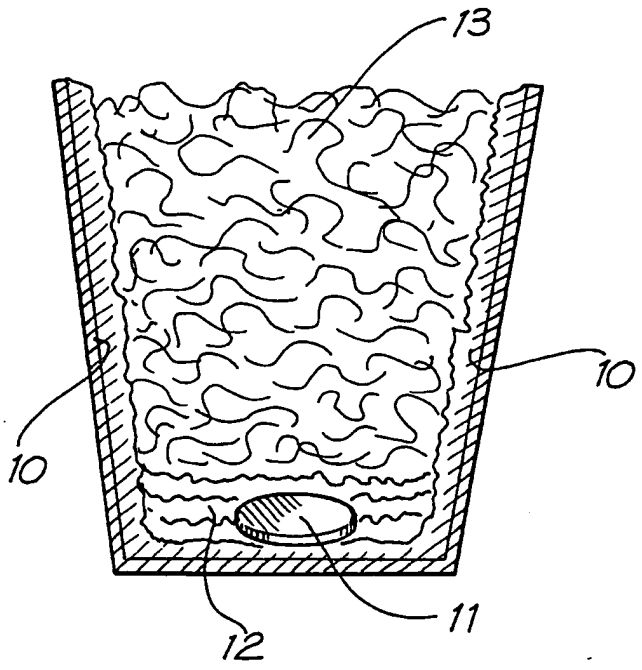


FIG. 1

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 93/00468

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl.[5] A01G 9/10 // D21J 7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: A01G 9/10

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
AU: IPC as above, A01G 9/00-9/10, D21J 7/-

Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to Claim No. |
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| Y | GB 2113517 (ORGANIC FIBRES LTD) 10 August 1983 (10.08.83)<br>page 1, lines 74-90 | 2, 4, 5 |
| X<br>Y | Derwent Abstract Accession No. 91-070229, Class P13, JP,A, 0-3019-627 (KANAI) 28 January 1991 (28.01.91) | 1<br>5, 7 |

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| A | AU,A, 51485/90 (ISOVER SAINT-GOBAIN) 27 September 1990 (27.09.90) page 1a, paragraph 4-page 2, paragraph 4 | 1-4 |
| A | AU,A, 16771/28 (STURMEY, J J H) 16 July 1929 (16.07.29) the whole document | 1-4 |
| A | Derwent Abstract Accession No. 89-090071, Class P13, JP,A, 0-1040-699 (FOSTER DENKI K K) 10 February 1989 (10.02.89) | 1, 5 |

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| AU | 73103/74 | US | 472871 | AR | 205903 | AT | 341321 |
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END OF ANNEX